3.0 FRAMEWORK FOR DETERMINING ENVIRONMENTAL ACCEPTABILITY

3.1 Overview

This framework for determining environmentally acceptable placement alternatives for dredged material can be applied nationwide and is relatively general, but comprehensive. This framework addresses a wide range of dredged material characteristics, dredging techniques, and management alternatives. Because this framework provides national guidance, flexibility is necessary. It should be used as a technical guide to evaluate the commonly important factors to be considered in managing dredged material in an environmentally acceptable manner.

The overall technical framework for developing environmentally acceptable alternatives for the discharge of dredged material is illustrated in Flowchart 3-1. As indicated in the flowchart, the framework determines the environmental acceptability of any of several alternatives considered. The framework presented is consistent with and incorporates the evaluations conducted under NEPA, CWA, and MPRSA and consists of the following broad steps, as illustrated in Flowchart 3-1:

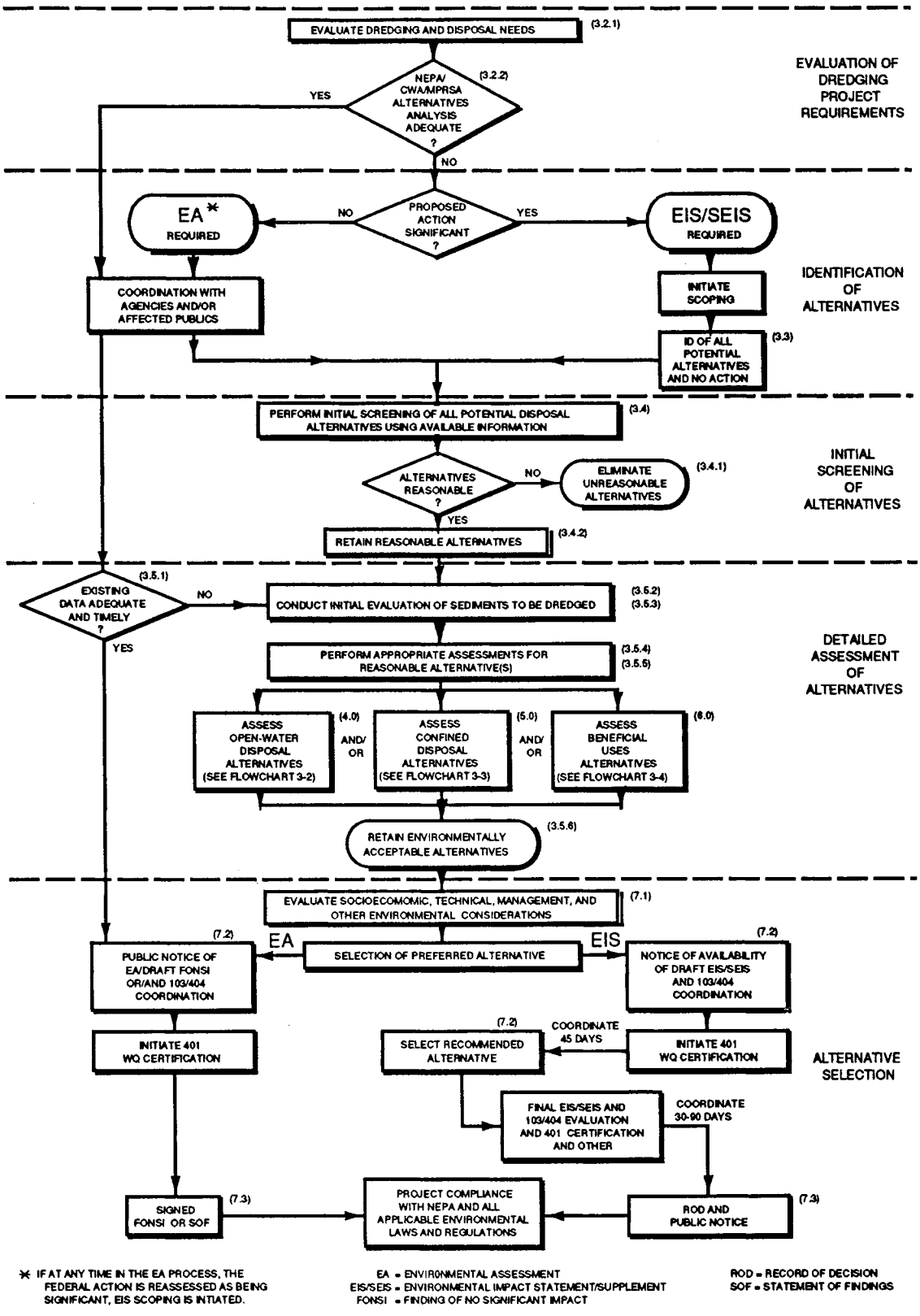
- Evaluation of dredging project requirements.
- Identification of alternatives.
- Initial screening of alternatives.
- Detailed assessment of alternatives.
- Alternative selection.

The framework logic is discussed in detail in the following paragraphs. The respective paragraph numbers are referenced as appropriate in the blocks of Flowchart 3-1. Additional portions of the framework pertaining to the detailed assessments of open-water disposal, confined disposal, and beneficial use alternatives are illustrated in Flowcharts 3-2, 3-3, and 3-4 and are described in Chapters 4, 5, and 6, respectively.

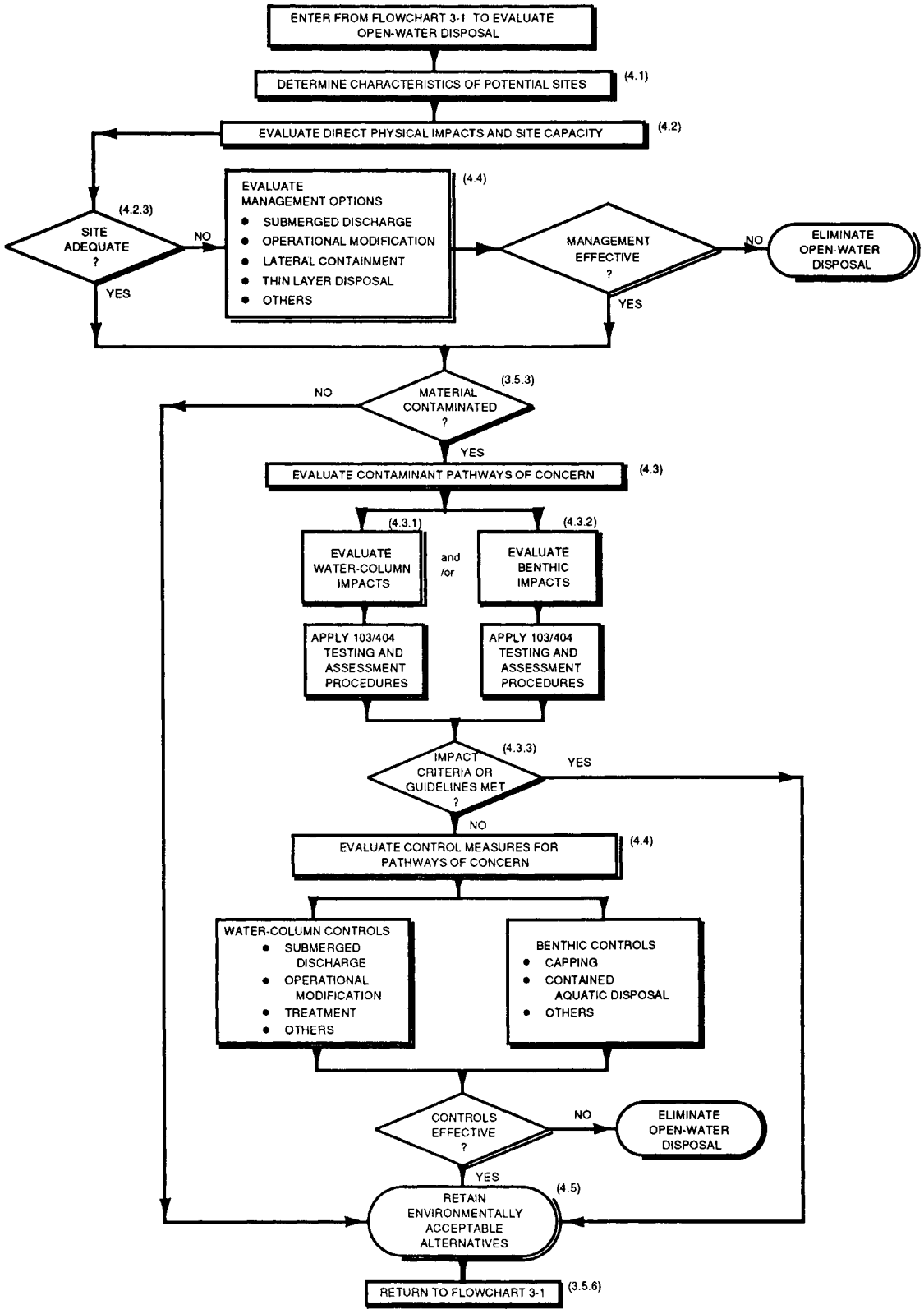
3.2 Evaluation of Dredging Project Requirements

3.2.1 Dredging Needs

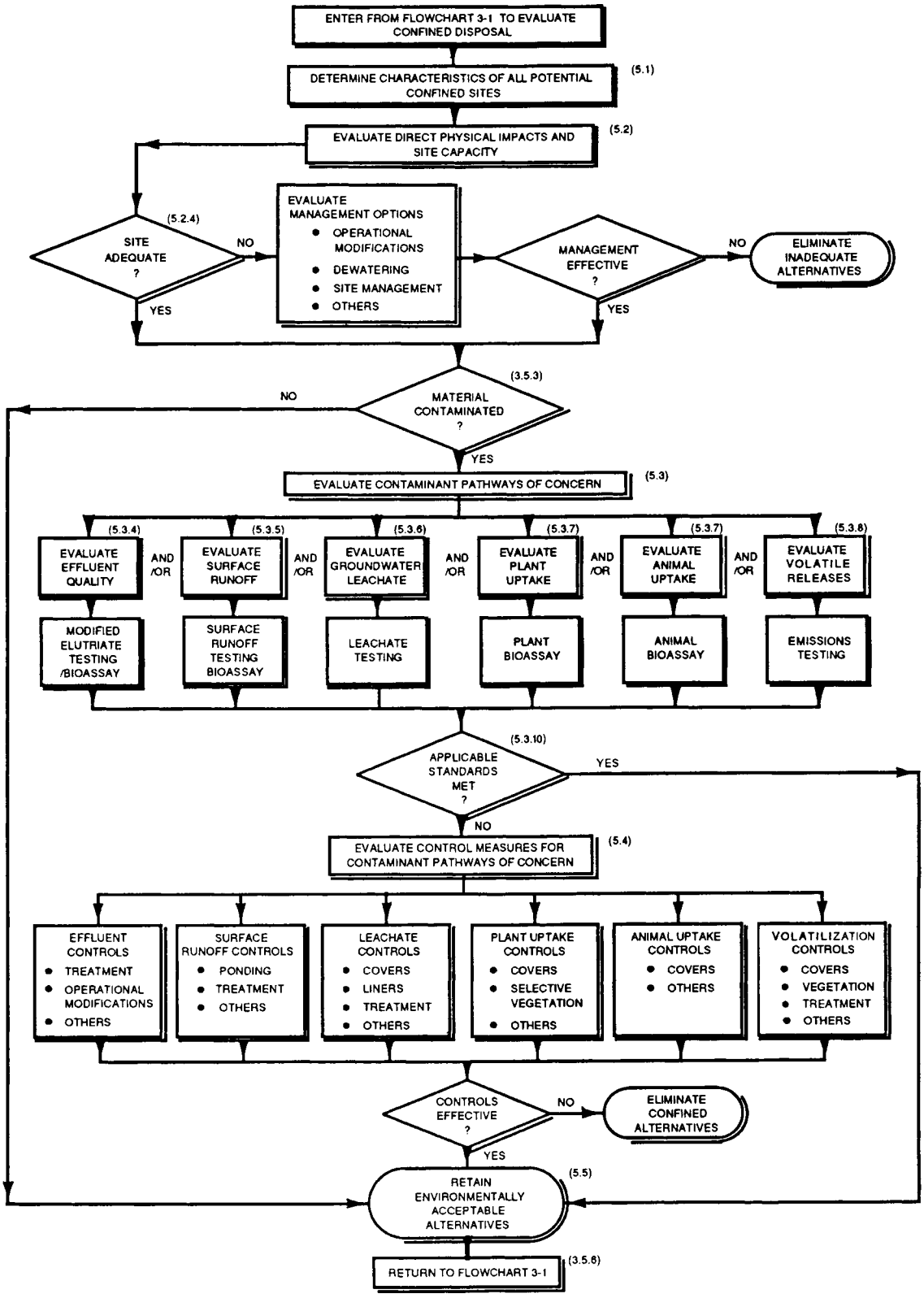
The need for dredging and the requirements for disposal must be established. Information gathered at this stage would include the dredging location(s), required volumes to be dredged, etc. Within the context of NEPA, the initial impact assessment for dredging projects relates to the purpose and need for the proposed action in the case of new work or continued viability (purpose, need, and effect of new information on



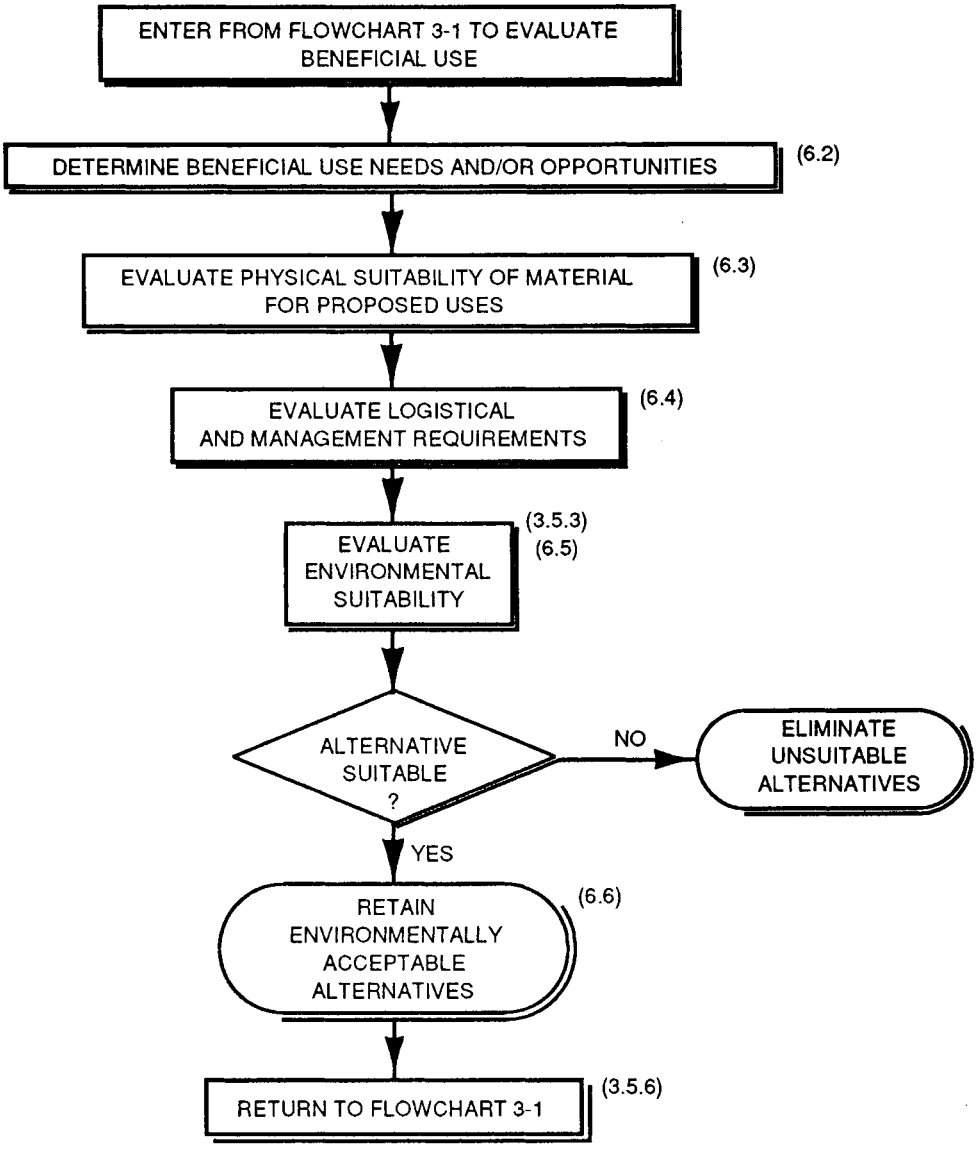
Flowchart 3-1. Framework for Determining Environmental Acceptability of Dredged Material Disposal Alternatives



Flowchart 3-2. Framework for Testing and Evaluation for Open-water Disposal



Flowchart 3-3. Framework for Testing and Evaluation for Confined (Diked) Disposal



Flowchart 3-4. Framework for Testing and Evaluation for Beneficial Use Applications

environmental acceptability of the proposal) in the case of existing projects. In contrast, the needs and determinations under CWA or MPRSA are specifically concerned with a justification of the need for dredged material disposal in waters of the United States or ocean waters, respectively. Both types of determinations are addressed in the detailed evaluation of alternatives in the NEPA document and may also be addressed in the project's purpose and need statement, compliance with environmental statutes, and other sections of the NEPA document where appropriate. In identifying reasonable alternatives to pursue, environmental impact, cost, and agency policy/regulation, among other factors, may be considered.

3.2.2 Determination of Availability of Alternatives and Coverage in Existing NEPA Document

A review of the project requirements in terms of all reasonable alternatives and the adequate coverage of these alternatives in the existing NEPA document should be made. Supplemental NEPA documentation is required when significant changes are made in the proposed alternative, or when significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts exist (40 CFR 1502.9 (c)). In particular, CWA/MPRSA alternatives analyses should be reviewed for adequacy. Evaluations conducted for purposes of MPRSA or CWA compliance indicating potential environmental impacts not previously considered in the selection of an alternative may trigger the need for a supplemental EA or EIS to ensure NEPA compliance.

3.3 Identification of Alternatives

Under the NEPA process, the potential environmental impacts of the discharge of dredged material including confined (diked), open water (CWA and/or MPRSA sites), and beneficial uses, must be considered, taking into consideration the nature and needs of the dredging projects and the material to be dredged. The NEPA scoping process encourages the identification of all potential alternatives for dredged material management. Proposed alternatives may consist of any combination of options as warranted by local conditions. Beneficial use of dredged material should be fully considered to ensure that benefits are maximized.

When a large number of potential alternatives exist, a reasonable number of examples covering the full spectrum of alternatives must be analyzed and compared in the NEPA document (40 CFR 1502.9(c)). The NEPA document must rigorously address reasonable alternatives that are beyond the capability of the applicant or project proponent or are beyond the jurisdiction of the lead agency. Under CEQ regulations, the No-Action (no dredging or continuation of an existing practice) alternative must also be included and retained throughout the NEPA process as a basis for impact comparison. Subsequent evaluations in the framework determine the reasonableness of alternatives identified at this level.

3.4 Initial Screening of Alternatives

An initial screening is undertaken to eliminate from further consideration those management alternatives that clearly are not reasonable for the specific project. Reasonable alternatives include those that are practical or feasible from the environmental, technical, and economic standpoint (40 CFR 1502.9 (c)), and use common sense, rather than being simply desirable from the standpoint of the project proponent or applicant. The screening should utilize all available information and should consider factors such as environmental concerns (e.g., endangered species), cost, technical feasibility (e.g., site availability and site characteristics that may be

incompatible with dredged sediment volume or characteristics or available dredging plant), and legal considerations.

All potential alternatives are evaluated with respect to the availability of the required site(s) and the likelihood that the site can be used. If there are no existing sites available, then a determination is made as to whether a site(s) can be designated and/or selected after taking into consideration the reasonableness of doing so for the project in question. For example, the time frame for designating an ocean site under MPRSA or selecting a CWA open-water site would have to be factored into this determination. In those cases where site designation by USEPA under Section 102 of MPRSA is required, the NEPA process for site designation and for the dredging project may be performed jointly or concurrently.

Consideration must also be given to design limitations of the project, climatic conditions, dredging equipment availability, physical and chemical aspects of the material to be dredged, local interests, public concerns, and known environmental and economic constraints. Maintenance history of the project in question or projects in the general area and the experience and knowledge of the public and resource agencies provide a basis for the screening process.

3.4.1 Eliminate Unreasonable Alternatives

Although the identification of innovative solutions is encouraged, the nature and needs of the dredging project must be considered in determining the reasonableness of alternatives. Alternatives that require sites that are not available, conflict with other site uses, violate applicable environmental regulations, or are found to be clearly technically or economically infeasible during the screening process, are eliminated from further detailed consideration. An alternative may be considered unreasonable and therefore eliminated from further consideration if the scoping process has determined it to be unreasonable. The rationale for eliminating alternatives should be clearly documented in the NEPA document. After application of these considerations by the lead agency[6], those alternatives that remain are scrutinized further for environmental, technical, and economic feasibility.

3.4.2 Retain Reasonable Alternative(s)

The above evaluation will result in an identification of alternatives that are reasonable from an environmental, technical, and economic standpoint. Each remaining option is then carried forward for detailed evaluation via the NEPA/CWA/MPRSA process. The final outcome of the detailed evaluation could be that the No-Action alternative is selected or the project not continued.

[6] See Guidance in 33 CFR 335-338 and ER 1105-2-100 and NEPA Regulations to define lead agency roles and responsibilities.

3.5 Detailed Assessment of Alternatives

For purposes of determining environmental acceptability, the detailed assessment of alternatives should include the following:

- Evaluation of the adequacy and timeliness of existing data.
- Evaluation of the physical characteristics of the sediment.
- Initial evaluation of sediment contamination.
- Performing appropriate testing and assessments (to include required CWA or MPRSA testing).
- Evaluation of management options or control measures.

Prior to conducting a detailed analysis of alternatives, conducting appropriate coordination between USACE, USEPA, and other agencies as appropriate is critical to ensure that any required sampling, testing, and evaluations are satisfactorily conducted.

Procedures for conducting the detailed evaluation of alternatives are described in the following paragraphs. Since the procedures for conducting detailed evaluations for open-water disposal, confined disposal, and beneficial use alternatives differ, additional details are presented in Chapters 4, 5, and 6, respectively. A wide variety of technical guidance documents are available and are referenced as appropriate in Chapters 4, 5, and 6. Computer-assisted management tools are also available for conducting many of the detailed assessments, which may be required (Schroeder et al. 2004).

In addition to those considerations for environmental acceptability, a detailed assessment of alternatives includes a comparative review of cost, technical feasibility, and other factors, as appropriate. Even though these additional considerations would normally be assessed as a part of the NEPA process for the project, they are beyond the scope of this document.

3.5.1 Adequacy and Timeliness of Data

Projects for which all reasonable alternatives have been identified and adequately evaluated still must be assessed in light of the CWA or MPRSA evaluation requirements. For those projects in the operations and maintenance or permit renewal category for which conditions have not changed, a preliminary assessment is made to determine the adequacy and relevance of previous information for the continuance of the dredging/disposal activities. If the existing data are sufficient to determine compliance with CWA or MPRSA, no additional data are required prior to preparation of the CWA or MPRSA evaluation and coordination of the Public Notice (see paragraph 3.6). For new-work Federal navigation projects, new permit applications, or projects for which information is insufficient, additional assessment following the framework as described here and in Chapters 4, 5, and 6 are required to determine the environmentally acceptable alternative(s).

3.5.2 Evaluate Physical Characteristics of Sediment

Evaluation of the physical characteristics of sediments proposed for discharge is necessary to determine potential environmental impacts of disposal, the need for additional chemical or biological testing, as well as potential beneficial use of the dredged material. If this information has not been gathered during the project evaluation phase, it must be obtained at this point in the framework. The physical characteristics of the dredged material include: particle-size distribution, water content or percent solids, specific gravity of solids, and plasticity characteristics. The sediment physical characteristics should also be evaluated from the standpoint of compatibility with different kinds of biological communities likely to develop for the disposal environments under consideration.

3.5.3 Conduct Initial Evaluation of Sediment Contamination

The initial screening for contamination is designed to determine, based on available information, if the sediments to be dredged contain any contaminants in forms and concentrations that are likely to cause unacceptable impacts to the environment. During this screening procedure, specific contaminants of concern are identified in a site-specific sediment, so that any subsequent evaluation is focused on the most pertinent contaminants.

Initial considerations should include but are not limited to:

- Potential routes by which contaminants could reasonably have been introduced to the sediments.
- Data from previous sediment chemical characterization and other tests of the material or other similar material in the vicinity, provided the comparisons are still appropriate.
- Probability of contamination from agricultural and urban surface runoff.
- Spills of contaminants in the area to be dredged.
- Industrial and municipal waste discharges (past and present).
- Source and prior use of dredged materials (e.g., beach nourishment).
- Substantial natural deposits of minerals and other natural substances.

Under CWA, some materials may be excluded from testing as specified in 40 CFR 230.60. Under MPRSA, testing must be conducted unless the exclusions in 227.13 (b) are met.

If the material does not meet the exclusions, contaminants must be addressed with respect to their potential for biological effects and/or release through applicable pathways. If such potential exists, the specific tests and assessments for contaminant pathways described in Section 3.5.4 will be required. If ocean-disposal alternatives are being considered, particular attention must be given to the presence of certain prohibited materials (40 CFR 227.6) other than as trace contaminants. Detailed guidance for chemical testing and evaluation of sediments can be found in USEPA/USACE (1995).

3.5.4 Perform Appropriate Testing and Assessments

Appropriate testing and assessments may be required to determine the physical behavior of the material at the disposal site. Also, testing and assessments for one or more potential contaminant pathways of concern may be required.

Physical testing and assessment should focus on both the short-term and long-term physical behavior of the material. For open-water alternatives, these assessments might include an analysis of water-column dispersion, mound development, and long-term mound stability or dispersion. For confined alternatives, these assessments might include an analysis of solids retention and storage requirements during disposal and long-term consolidation behavior in the CDF. Guidance for conducting physical testing and assessments is described in Chapters 4, 5, and 6.

Any contaminant testing should focus on those contaminant pathways where contaminants may be of environmental concern, and the testing should be tailored to the available disposal site. The considerations for identifying contaminant pathways of concern for open-water disposal and confined disposal alternatives are discussed in Chapters 4 and 5, respectively. For open-water alternatives, contaminant problems may be related to either the water column or benthic environment, and the appropriate testing and assessments would include required CWA or MPRSA testing. For confined sites, potential contaminant problems may be either water quality related (return water effluent, surface runoff, and groundwater leachate), contaminant uptake related (plant or animal), or air related (gaseous release).

The identification of pathways of concern should be based on the initial evaluation of sediment contamination and on the known characteristics of disposal sites under consideration. One of the following determinations will result for each pathway:

- If the initial evaluation of sediment contamination and site characteristics reveals that the material can be excluded from further testing or that adequate data already exist for a given contaminant pathway, then no additional contaminant testing for that pathway is required.

- In some cases, past evaluations of sediment contamination and site characteristics may indicate that contaminants would clearly result in unacceptable impacts through a given pathway. In this case, a determination can be made without further testing that management actions or control measures will be required for that pathway.

- Finally, there may not be sufficient technical information to allow for a factual determination for one or more pathways of concern. The potential impact of specific contaminant pathways must then be evaluated using appropriate testing and evaluations for those pathways. Risk assessment is employed implicitly in making a factual determination, as an integral part of development of many sediment and water quality criteria. If conventional

pathway testing and evaluation does not yield a definitive determination, however, risk assessment may be employed explicitly to reach a factual determination (USEPA 1998; Moore, Bridges and Cura 1998).

Design of a testing program for the sediment to be dredged depends on the pathways of concern for the alternative being evaluated. Protocols have been developed to evaluate contaminant pathways of concern and consider the unique nature of dredged material and the physicochemical conditions of each disposal site under consideration.

The testing guidelines that have been developed jointly by the USEPA and USACE incorporate a tiered approach and scientifically based decision process that uses only the level of testing necessary to provide the technical information needed to assess the potential chemical and biological effects of the proposed disposal activity. Detailed testing procedures for evaluation of ocean disposal under the MPRSA are found in the Ocean Testing Manual (USEPA/USACE 1991), while detailed testing procedures for evaluation of placement in U.S. waters under the CWA are found in the Inland Testing Manual (USEPA/USACE 1998). The Upland Testing Manual (USACE 2003) provides detailed procedures for evaluation of dredged material proposed for disposal at CDFs. Other relevant procedures are available (Francingues et al. 1985; Lee et al. 1991). Testing and evaluations for specific contaminant pathways for open-water and confined-disposal alternatives is discussed in more detail in Chapters 4 and 5, respectively.

3.5.5 Evaluate Management Actions or Control Measures to Minimize Impacts

In cases where results of tests or assessments indicate that the MPRSA impact Criteria or CWA Guidelines for a given pathway will not be met, management actions should be considered to reduce potential environmental impacts (33 CFR 335-338; Francingues et al. 1985; Lee et al. 1991; Cullinane et al. 1986). Management actions or control measures may be considered for physical and/or contaminant impacts.

Possible controls for open-water alternatives include operational modifications, use of submerged discharge, treatment, lateral containment, and capping or contained aquatic disposal. Possible controls for confined (diked) disposal include operational modifications, treatment, and various site controls (e.g., covers and liners). Descriptions of management and control measures for open-water and confined alternatives and procedures for assessing site-specific effectiveness are given in Chapters 4 and 5, respectively.

The effectiveness of management controls for contaminated sediments must be carefully considered, since no disposal option and/or management action or control measure is without risk. When considering the use of management actions or controls, the following factors must be considered:

- Probability of success of a given control.
- Monitoring required to confirm the effectiveness of the control.

- Duration and significance of adverse effects should a given control prove to be ineffective.
- Availability, feasibility, timeliness, and cost of additional management actions should they be required.

3.5.6 Retention of Environmentally Acceptable Alternatives

With the completion of detailed testing and assessments and the consideration of management and control measures for the respective alternatives, a determination of environmental acceptability is made. This determination must ensure that all applicable standards or criteria are met. If control measures were considered, a determination of the effectiveness of the control measure in meeting the standards or criteria must be made. If all standards or criteria are met, the alternative can be considered environmentally acceptable. At this point in the framework, socioeconomic, technical, and other applicable environmental considerations must be evaluated prior to the selection of a management alternative.

3.6 Alternative Selection

The detailed assessment of alternatives may result in one or more alternatives which are environmentally acceptable. Weighing and balancing of all environmental, technical, and economic factors must be conducted before the selection of the preferred/proposed alternative by the lead agency. The process for conducting this weighing and balancing is described in the implementing regulations of NEPA/CWA/MPRSA.

The major steps for coordination and documentation associated with alternative selection are illustrated in Flowchart 3-1. The coordination and documentation process includes draft and final NEPA/CWA/MPRSA documents, Public Notices, and a final-decision document which addresses comments on the draft NEPA/CWA/MPRSA documents.

The selection of a preferred/proposed alternative is based on environmental acceptability, technical feasibility, costs, and other factors, as appropriate. A detailed discussion of factors in decision making other than environmental acceptability is beyond the scope of this document. However, considerations in alternative selection, including a description of the procedures to be followed with respect to NEPA, CWA, and MPRSA, are discussed in Chapter 7. Once an alternative has been selected, proper coordination and documentation has been completed, and a final-decision document has been issued, the project should be in compliance with NEPA and all applicable environmental laws and regulations.